

Where did you look and what did you find? (Note any search parameters you used, if you find something noteworthy on-line.)

I looked online, primarily using google, a bit of yahoo. I note every search parameter and every link in a long and browsing search beginning with a google search of **NASA - earth science**. First site: <http://science.hq.nasa.gov/> ending 68 sites later at <http://www.spacefellowship.com/News/?p=1557>

I then went directly to <http://earthobservatory.nasa.gov/>

I had come across this site 46 sites into my initial search. At that point, I had visited ✓ **Earth Observatory: News /** <http://earthobservatory.nasa.gov/Newsroom/> and ✓ **Earth Observatory: Experiments** - but hadn't gone into the subject areas (Atmosphere, Oceans, Land, Energy, and Life) within the earth observatory site.

I went directly to <http://earthobservatory.nasa.gov/> because prior to my colloquium address on storytelling in early 06, I had asked for some insight into NASA's scientist's use of stories. NASA's Barbara Thompson had referred me to the Features section of this site as the home of the best stories. After all my searching, it still is.

I then looked briefly at this site's entire collection of Features, and after a quick evaluation compiled (Appendix 1) a list of the Features which I believe actually deliver stories.

I based this on a few criteria. Is there one of more clear protagonists? That is, is it about human beings? Is there a person for the audience to identify with or follow? Is it more than an interview about information? Does the protagonist pursue a goal or goals? Are there obstacles to be overcome? Are there twists or turns? Is there a world - including time, place, and/or other descriptive traits?

I also did a brief reverse search on google. Unlike my initial search where I included the term NASA as part of my search, this time I searched for topics I assume NASA is involved with. I noted how early the search led me to a NASA site.

The results of a few google item searches are as follows:

Earth Observation - 1- 20 sites

#2: <http://eos.nasa.gov/>

Earth Observing System (EOS)

#13: <http://earthobservatory.nasa.gov/>

NASA: Earth Observatory

#19: <http://earth.jsc.nasa.gov/sseop/efs/>

The Gateway to Astronaut Photography of Earth

Earth System Science - 1 - 40 sites

#7: <http://science.hq.nasa.gov/earth-sun/science/essp.html>

science@nasa - Earth System Science Pathfinder -

#11: <http://science.hq.nasa.gov/>

Destination Earth

#26: http://research.hq.nasa.gov/code_y/code_y.cfm

NASA Research Opportunities

#28: <http://www.ghcc.msfc.nasa.gov/>

The content of this page has been incorporated into the Global Hydrology and Climate Center Page suite. You will be taken there momentarily,

Earth Atmosphere - 1- 80 sites

#2: <http://liftoff.msfc.nasa.gov/academy/space/atmosphere.html>

The Atmosphere

#20: http://science.nasa.gov/newhome/essd/atmosphere_today.htm

Today From Space: The Earth's Atmosphere:

Near Real-Time Research Imagery

#27: http://science.nasa.gov/newhome/headlines/ast08dec98_1.htm

Solar wind blows some of Earth's atmosphere into space

Earth Lithosphere - 1 - 100 sites

#17 <http://scign.jpl.nasa.gov/learn/plate1.htm>

Structure of the Earth

#27: http://scign.jpl.nasa.gov/learn_unix/glossary.htm

Glossary

Climate Science - 1-150 sites

#28 -- <http://www.giss.nasa.gov/research/briefs/>

NASA GISS: Science Briefs

Q: What did you learn?

NASA is extensively involved with Earth Science.

From this site --

(3) <http://science.hq.nasa.gov/earth-sun/index.html> - I learned that

We need to understand the Earth's atmosphere, lithosphere, hydrosphere, cryosphere, and biosphere as a single connected system.

NASA recently completed deployment of the [Earth Observing System](#), the world's most advanced and comprehensive capability to measure global climate change.

Earth science research can ascertain whether and how the Earth can sustain this growth in the future. Also, over a third of the US economy - \$3 trillion annually - is influenced by climate, weather, space weather, and natural hazards, providing economic incentive to study the Earth.

NASA Earth System Science conducts and sponsors research, collects new observations from space, develops technologies and extends science and technology education to learners of all ages.

From this site --

(7) <http://www.usgcrp.gov/usgcrp/agencies/nasa.htm> - I learned that

NASA's Earth science programs are essential to the implementation of three major Presidential initiatives: Climate Change Research (June 2001), Global Earth Observation (July 2003), and Ocean Action (December 2004).

NASA Earth science programs are aimed at understanding the Earth system and applying Earth system science to improve prediction of climate, weather, and natural hazards in partnership with other Federal agencies and international space and research programs.

Five subordinate questions describe NASA's Earth system science approach via a paradigm of variability, forcing, response, consequence, and prediction:

- *How is the global Earth system changing?*
- *What are the primary causes of change in the Earth system?*
- *How does the Earth system respond to natural and human-induced change?*
- *What are the consequences of change in the Earth system for human civilization?*
- *How well can we predict future changes in the Earth system?*

NASA pioneered the interdisciplinary field of Earth system science, which explores the interaction among land, oceans, atmosphere, ice, and life.

From this site - (9) <http://science.hq.nasa.gov/earth-sun/science/> -- I learned

NASA's goal in Earth science is to observe, understand, and model the Earth system to discover how it is changing, to better predict change, and to understand the consequences for life on Earth. We do so by characterizing, understanding, and predicting change in major Earth system processes and by linking our models of these processes together in an increasingly integrated way.

I learned about future plans, budgets, related research.

I found some interesting areas - Climate Science, Climate Change, Earth Science FAQ, Scientific Research Firsts, Looking at Earth, etc.

In my log of my search, I comment on aspects of the sites - attractiveness, design, user-friendliness, timeliness etc. In my opinion, though there are exceptions, overall NASA's sites are do not rate highly in these areas.

NEGATIVE EXAMPLES:

[within (7) <http://www.usgcrp.gov/usgcrp/agencies/nasa.htm>]

- NASA's Earth Science Enterprise,
[Multimedia Library](#)

Find out more about NASA's Earth Science Enterprise; these multimedia presentations highlight our historical and recent accomplishments.

**** uninviting design, dull, bureaucratic layout

**** long scrolling pages

- [Understanding Our Changing Planet: 1999 Earth Science Enterprise Fact Book \(PDF\)](#). Provides an overview of the ESE Program as well as information about why we study the Earth and what we hope to accomplish.

**** title looks promising till you realize it's dated 1999

- (8) <http://www.usgcrp.gov/usgcrp/links/agencylinks.htm#nasa>
[Earth Science Missions: Quick Reference Guide](#).

Science of the Earth System.

- [Atmospheric Chemistry](#)
- [Hydrological and Energy Cycle](#)
- [Land Cover/Land Use](#)
- [Ozone](#)
- [Natural Hazards and Solid Earth](#)
- [Climate Variability and Change](#) (note: as of Jan 2001, no page posted)

**** again dated, latest date: 2001

[within (12) <http://outside.gsfc.nasa.gov/ESD/edu/>]

✓ Meet our people

**** not really - just contact info and organizational charts

- ✓ Our History

(14) <http://webserv.gsfc.nasa.gov/metadot/index.pl?iid=1829>

Looking at the Earth from Space - 40+ Years of NASA Earth Science

**** small print, dense paragraphs, does communicate a sense of the evolution of the program

✓ Earthgazer

(19) <http://earthgazer.nasa.gov/pages/image.html>

**** under construction

✓ News

(39) <http://geo.arc.nasa.gov/sg/esdnews.html>

Welcome to the ESD News

**** text, small type, boring looking, wordy

✓ Earth Science Project Office

(40) <http://www.espo.nasa.gov/>

**** text, small type, boring looking, wordy

✓ Missions

(41) <http://geo.arc.nasa.gov/sg/missionspage.html>

**** old fashioned design, wordy, text-heavy descriptions of missions

(43) <http://geo.arc.nasa.gov/sg/resprojsum.html>

**** links to a long page of projects, old fashioned template design, all text

**** links to ill-designed page with boring descriptions

✓ Earth Songs

(48) http://science.nasa.gov/headlines/y2001/ast19jan_1.htm

Our planet is a natural source of radio waves at audio frequencies. An online receiver at the Marshall Space Flight Center is playing these songs of Earth so anyone can listen.

**** includes link “listen to this story (requires RealPlayer)”

**** seems like fun, though the page design is ancient, awkward, long page, wordy

EXAMPLES WHERE NASA IS HARD TO FIND -

✓ Earth Sciences in the Yahoo! Directory

(50) http://dir.yahoo.com/Science/Earth_Sciences/

✓ Earth Science World

(51) <http://www.earthscienceworld.org/>

**** nice inviting American Geological Institute site - no apparent refs to NASA

** ✓ back to yahoo

(52) <http://www.earthscape.org/>

**** another attractive site - Columbia U -- though a little too busy - no apparent refs to NASA

** ↗ back to yahoo

↗ earth's calendar

(54) <http://www.phschool.com/science/planetdiary/calendar/>

**** this date in earth science history - no apparent NASA refs

↗ atmosphere

(56) <http://www.phschool.com/science/planetdiary/links/atmosphere.html>

**** several refs to EPA, only one to NASA

↗ Organizations

(61) http://dir.yahoo.com/Science/Earth_Sciences/Organizations/

**** NASA not included

MOST INVITING SITES - WITH OR WITHOUT NASA REFERENCES

↗ Visible Earth

(18) <http://visibleearth.nasa.gov/>

**** amazing galleries & links to archives, but why has it taken me this long to get here?

↗ Latest News

(23) <http://earthsciences.gsfc.nasa.gov/metadot/index.pl>

**** numerous links

↗ Slab Of Sunken Ocean Floor Found Deep Within Earth (Arizona State University 6/3/06)

(32) <http://www.sciencedaily.com/releases/2006/06/060603092903.htm>

**** Science Daily article - one of the most inviting pages yet

**** back to

(33) <http://gcmd.nasa.gov/Resources/pointers/weblights.html>

↗ Sinking Levees: New Report Maps Subsidence, Addresses Flooding In New Orleans (University of Miami 6/1/06)

(34) <http://www.sciencedaily.com/releases/2006/06/060601092002.htm>

**** Science Daily article - one of the most inviting pages yet

↗ Links

(35) <http://gcmd.nasa.gov/Resources/pointers/pointwais.html>

Links to Related Earth Science Sites/Resources

Choose any category from the list on the left to view other Earth Science web resources.

**** obviously a great set of links from "Global Warming & Climate Change" to "Newsletters, Journals & Listservers"

↗ Earth Science FAQ

**** from “What is El Niño/La Niña and what are its effects on the planet?” to “Why doesn't the nitrous oxide in the air make us funny?”

These lead to pages with more links --

✓ Discoveries

(38) <http://geo.arc.nasa.gov/sg/Scienceres.html>

Scientific Research "Firsts"

**** fun page of earth science division's “firsts”, bullets such as “First airborne observations of the Super Greenhouse Effect over the central Pacific Ocean”

✓ Earth Observatory: News

(45) <http://earthobservatory.nasa.gov/Newsroom/>

Welcome to the Newsroom, your one-stop source for the latest news on Earth science research. NASA news announcements, summaries of headline news, listings of new published research, and more are here and are updated each week.

**** pretty good page - opens to NASA NEWS, In the Headlines, Research Highlights, Media Alerts, Media Resources, Field Research, Site Updates - but only updated weekly

✓ Earth Observatory : Experiments

Listed below are interactive experiments that can be used to teach all ages about the art and science of space-based Remote Sensing. The experiments focus on how NASA uses Remote Sensing to study how and why Earth changes.

**** links to experiments such as “global warming” and “remote sensing -- earthquakes”

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(52) <http://www.earthscape.org/>

**** another attractive site - Columbia U -- though a little too busy - no apparent refs to NASA

✓ Discovery Channel: Planet Earth Guide

(57) <http://dsc.discovery.com/guides/planetearth/planetearth.html>

**** attractive site, promoting network's shows -- no apparent NASA refs

**** I searched the site for NASA and got 1710 news stories

✓ **NASA: Looking at Earth**

(60) <http://www.nasa.gov/topics/earth/>

Welcome to Looking at Earth. NASA keeps a watchful eye on our planet, studying everything from weather patterns to the effects of pollution.

**** pretty cool page - NASA in space “looking at earth”

✓ **Exploring the Environment**

(62) <http://www.cet.edu/ete/>

ETE is made possible through a cooperative agreement with the NASA Goddard Space Flight Center and is supported by NASA's Learning Technology Program (LTP)

**** good looking page, coral reef module

✓ **NASA COTF WebSite**

(63) <http://www.cotf.edu/>

**** classroom of the future

**** cool looking - but not specifically about earth science

MY FAVORITE NASA SITE IS (69) [HTTP://EARTHOBSERVATORY.NASA.GOV/](http://earthobservatory.nasa.gov/)

Appendix 1 is a list of those “Features” I believe qualify as fairly compelling human stories

Q: Were there any memorable messages?

We need to understand the Earth's atmosphere, lithosphere, hydrosphere, cryosphere, and biosphere as a single connected system.

Over a third of the US economy - \$3 trillion annually - is influenced by climate, weather, space weather, and natural hazards, providing economic incentive to study the Earth.

NASA pioneered the interdisciplinary field of Earth system science and applies it to improve prediction of climate, weather, and natural hazards.

Q: What didn't you find that you thought you would/should?

Based on looking almost entirely on the web:

- NASA's sites do not offer attractive, appealing, or up-to-date enough design and delivery of information.
- Not enough stories.
- Not clear and consistent enough reinforcement of the planetary, single connected system model.

Q: Compare how you know to effectively communicate scientific information to what you find from NASA.

Q: Do the materials you find effectively tell NASA's Earth science stories the way a good storyteller should?

Q: Which materials do, and which ones don't?

To paraphrase the last paragraph of my plenary speech,

“Number numb, jargon jars, and nobody ever marched on Washington because of a pie chart. If you really want to get people to invest in NASA's Earth Science, give them what they're already waiting for – tell them your stories. They are the most powerful tools you have. And when you're doing work that's as important as yours is, why would you want to use anything less?”

Now, I'm often talking to non-profits, foundations, and public agencies who provide direct services. Obviously with sophisticated science data plays a crucial role. But just as I say to them, open with stories and close with data. In terms of building the kind of public awareness, understanding and support that you need to demand greater funding, you've got great stories. Stories build relationship. Learn which ones to tell. Learn how to tell them. Learn how to consistently reinforce the planetary connected system vision in your stories. And of course, sell the crucial need you fill and the critical benefits you deliver.

Your best story site is Earth Observatory: Features at <http://earthobservatory.nasa.gov>

Improve it, learn from it, imitate it.

Q: How do you interpret the information?

Q: How would members of your assigned audience perceive or interpret that information? Is there a difference?

Q: What attitudes and opinions did you form?

Q: What, if any, is (are) the main message(s) that you gather and learn about NASA's Earth science?

Q: Do you perceive a main message, or core set of messages?

Q: If so, what are they?

Q: What recommendations would you make to NASA based upon all of the above?"

I love this cluster of messages:

NASA pioneered the interdisciplinary field of Earth system science: defining, observing, and interacting with the Earth's atmosphere, land, oceans, ice and life as a single, connected system.*

Over a third of the US economy - \$3 trillion annually - is influenced by climate, weather, space weather, and natural hazards - a strong economic argument for applying Earth system science to improving our capacity to predict and deal with them.

My biggest question is not whether this should be a high scientific and funding priority, but rather why is it being pioneered and led by the National Aeronautics and Space Administration.

My short off the top of my head response is this. It should be easy to convince the public that this stuff is more important than space travel. After Katrina, the tsunami, the heat on global warming, as it were. High gas prices might even help. Compared to space travel, this is where the science hits the road. But it is not intuitive to me at all that NASA is who I would expect to lead.

At this moment, if two entities went before the public for funding - and neither one of them was named NASA. One said, I want to study the planets and moons, and the other said I want to study planet earth; one said, I want to figure out whether there was ever life on mars, and the other says, I want to figure out how to preserve life on earth - it seems to me, I know who gets funded.

Would your earth missions seem more fundable to the general public if they weren't being done by a space agency?

I'm sure NASA has answers for that - as simple as NASA's unique capacity to observe earth phenomena, both from space and utilizing a lot of the same expertise they use observing other planets. NASA has for years been observing other planets as whole systems, so that perspective comes more naturally to them than to other earth-bound scientific specialists.

But I think, if true, the problem I'm suspecting needs to be acknowledged and addressed. If NASA remains the place for this work, then come up with a message that overcomes the "confusion."

Publicize more the Earth Sciences division within NASA. Brand it as the NASA Planet Earth - the NASA we didn't know we needed, but we're sure as hell lucky we've got.

We thought it would be cool to study other planets. But when we realized we were confronting natural phenomena bigger than ever before right here on earth. We needed some scientists good at studying huge, even planetary systems. Luckily they existed - at NASA.

Because it's neither rooted in scientific knowledge or strategic communications expertise, I might not say what I'm about say if I were the only one you were hearing from. But I'm going to give you my personal response, as a "relatively uninformed informal educator" -- your words. I do think, however, I probably represent a lot of folks who want to understand more what you do, what we're learning from what you do, and how well we're doing -- or not doing - in using what we learn to get better at anticipating, designing and managing our role within that single, connected system.

It appears that we, humans, have relatively little power in comparison with the other players - atmosphere, land, oceans, ice and the rest of life - but we have consciousness and an intelligence fairly well suited in some ways to the task.

In terms of our intelligence, it appears to me that we have been lagging behind in experiencing with immediacy the anticipated consequences of distant trends or events, whether in time or space -- short term thinking, instant gratification, quarterly profits, overnight ratings; toxic pollution, public health, pandemics, poverty, the inequities of global trade. A lot of what we call unintended consequences are probably more accurately unattended.

Global climate change, of course, scores high in both dimensions -- it's long term and global.

So NASA pioneered the interdisciplinary field of Earth system science: defining, observing, and interacting with the Earth's atmosphere, land, oceans, ice and life as a single, connected system.

Long overdue. Reality is alive, after all. Interconnected systems may still be too logical to accurately describe how reality actually shows up, but it's pretty close. Whether there's a designer involved or not, as far as I can tell, the more we learn, the more the dynamic interdependent-systems-within-a-system model is not only the most satisfying but also the most effective, useful, and pragmatic.

I'm not sure I got this crucial single, connected system message reinforced as I searched and browsed. I felt I was moving from one subject, issue, project, or mission, to another.

You are in the right place at the right time. We've got the need, and you've got the understanding, and the technology - in terms of instruments for observation and analysis and computer power for analysis and modeling.

You should do this work because you're the planetary guys - so keep that planetary vision alive in communicating about everything you do.

In 1961 it made sense to dedicate the country to landing a man on the moon. In 2007, what are the promises NASA Earth Scientists/NASA Planet Earth can offer - in terms of climate, disasters, energy?

* option: Defining, observing, and interacting with the Earth's atmosphere, lithosphere, hydrosphere, cryosphere, and biosphere as a single connected system.

APPENDIX 1: EARTH OBSERVATORY -- FEATURES - STORIES

Atmosphere - Features

✓ Enhancing Research and Education through Partnerships
<http://earthobservatory.nasa.gov/Study/Partnerships/>

✓ A New IDEA in Air Quality Monitoring
<http://earthobservatory.nasa.gov/Study/IDEA/>

✓ Clouds are Cooler than Smoke
<http://earthobservatory.nasa.gov/Study/SmokeClouds/>

✓ Smoke's Surprising Secret
<http://earthobservatory.nasa.gov/Study/SmokeSecret/>

✓ Little Islands, Big Wake
<http://earthobservatory.nasa.gov/Study/Wake/>

✓ The Road to Recovery (DAAC Study)
<http://earthobservatory.nasa.gov/Study/recovery/>

✓ Does the Earth Have an Iris Analog
<http://earthobservatory.nasa.gov/Study/Iris/>

✓ Scientist for a Day (DAAC Study)
<http://earthobservatory.nasa.gov/Study/ForADay/>

✓ Clouds in the Balance (DAAC Study)
<http://earthobservatory.nasa.gov/Study/CloudsInBalance/>

✓ A Violent Sun Affects the Earth's Ozone
<http://earthobservatory.nasa.gov/Study/ProtonOzone/>

✓ When the Dust Settles (DAAC Study)
<http://earthobservatory.nasa.gov/Study/Dust/>

✓ Volcanoes and Climate Change (DAAC Study)
<http://earthobservatory.nasa.gov/Study/Volcano/>

✓ Changing Our Weather One Smokestack at a Time
<http://earthobservatory.nasa.gov/Study/Pollution/>

✓ Stars, Clouds, Crops (DAAC Study)
<http://earthobservatory.nasa.gov/Study/StarsCloudsCrops/>

✓ Shadows of Doubt
<http://earthobservatory.nasa.gov/Study/ShadowsDoubt/>

✓ Blanket of Clouds (DAAC Study)

<http://earthobservatory.nasa.gov/Study/BlanketClouds/>

Oceans - Features

✓ Winds Connect Snow to Sea

<http://earthobservatory.nasa.gov/Study/Monsoon/>

✓ Time on the Shelf

<http://earthobservatory.nasa.gov/Study/TimeShelf/>

✓ Cheyenne and Catarina

<http://earthobservatory.nasa.gov/Study/Cheyenne/>

✓ High Water

<http://earthobservatory.nasa.gov/Study/HighWater/>

✓ Vanishing Ice (DAAC Study)

<http://earthobservatory.nasa.gov/Study/vanishing/>

✓ Fish Kill in the Gulf of Oman

<http://earthobservatory.nasa.gov/Study/oman/>

✓ Fragment of its Former Shelf (DAAC Study)

<http://earthobservatory.nasa.gov/Study/LarsenIceShelf/>

✓ Climate Clues in the Ice (DAAC Study)

<http://earthobservatory.nasa.gov/Study/ClimateClues/>

✓ Illuminating Photosynthesis in the Arabian Sea (DAAC Study)

<http://earthobservatory.nasa.gov/Study/ArabianSea/>

Land - Features

✓ Looking for Lawns

<http://earthobservatory.nasa.gov/Study/Lawn/>

✓ Fire Emergency in Acre, Brazil

<http://earthobservatory.nasa.gov/Study/Acre/>

✓ Stealing Rain from the Rainforest

<http://earthobservatory.nasa.gov/Study/AmazonDrought/>

✓ Mayan Mysteries (DAAC Study)

<http://earthobservatory.nasa.gov/Study/Maya/>

✓ Uncovering Chameleons

<http://earthobservatory.nasa.gov/Study/Chameleons/>

✓ How on Earth was this Image Made?

<http://earthobservatory.nasa.gov/Study/LivingEarth/>

✓ Hantavirus Risk Maps (DAAC Study)

<http://earthobservatory.nasa.gov/Study/Hanta/>

✓ Location, Location, Location (DAAC Study)

<http://earthobservatory.nasa.gov/Study/Location/>

Energy - Features

✓ Roger Revelle

<http://earthobservatory.nasa.gov/Library/Giants/Revelle/>

✓ Tais that Bind (DAAC Study)

<http://earthobservatory.nasa.gov/Study/TaiLanguage/>

✓ Fish in the Trees (DAAC Study)

<http://earthobservatory.nasa.gov/Study/FishTrees/>

Life - Features

✓ Rising Cost of Natural Hazards

<http://earthobservatory.nasa.gov/Study/RisingCost/>

